VAN WYK'S VLEY.

By Mr. Garwood Alston.

[Read 28th October, 1891.]

The large dam at Van Wyk's Vley was designed and constructed by and under our late Hydraulic Engineer, J. G. Gamble, Esq., and was completed in 1883, the distributing furrow was made in the summer of 1884–5, and the arable lands were first put under cultivation in 1885.

Van Wyk's Vley is situated about fifty miles north of Carnarvon, being about one hundred and twenty miles from Victoria West, and the main road to Kenhardt and Upington runs over the farm. The dam is placed on an affluent of the main river draining the Carnarvon Division and about seven miles above the junction of the two streams. The cultivated lands are in the triangle formed by the two streams and the available area is very great, probably two thousand morgen within the triangle and another two thousand on the right bank of the main stream and away below the junction.

The "supply furrow," of which I hand in photographs, connects the main stream with the dam and is run at such a level as to discharge into the dam at a little below high water mark. For the lower two miles of its course it runs almost parallel to the main distributing channel but of course the waters flow in opposite directions.

The dam wall is 33 feet in height and I think 980 feet in length, about 10 feet broad on top and 175 feet at the base. For accurate dimensions I refer you to one of Mr. Gamble's reports where excellent plans and sections of the work are given. It is calculated that if filled to the depth of 27 feet (measuring to the sill of the discharge pipe) the reservoir will contain 35,000,000,000 gallons—thirty-five thousand millions! say seven hundred times as much as can be stored by all the Cape Town reservoirs together, or eighty times as much as the Beaufort West dam can contain.

The water service is regulated from a tower similar to that in the Molteno reservoir, the main distributing furrow is upwards of six miles in length, the branch furrow serving the village is two

miles, and the supply furrow is nine and a half miles long ; the total expenditure on the dam and furrows being perhaps twenty-six thousand pounds : I have no means of arriving at the exact cost.

There being no permanent streams in the neighbourhood the dam is entirely dependent on periodical floods for its catch of water, and the area cultivated is again dependent on the quantity of water at command in April or May (the beginning of the sowing and end of our rainy season) of each year. There were sown in

1885 a trial patch only
1886 = 200 morgen
1887 = 600 „
1888 = 300 „
1889 = 90 „
1890 = 300 „
1891 = 300 „

or say an average of 300 morgen per annum for six years.

The depth of water, to sill of discharge pipe, caught in 1887 was thirteen feet but the area sown was limited by the size of the distributing furrow, and a very much larger area could have been put under crops during that season had the furrow been of sufficient size. I do not think however that Mr. Gamble was at the time aware that our only possible paying crop for a large area would be that of wheat and that in consequence the whole area under cultivation must be soaked once to make ready for ploughing during the two months of May and June, a practice which causes the expenditure of water at that time to be far above the average for the remainder of the year ; and this practice being unknown to Mr. Gamble causes a limitation of the possible irrigable area with the present dimensions of the main furrow for distribution of water. But it happened that in 1888 we suffered partial drought and it was due to the fact of our having a large surplusage of water from 1887 that we were enabled to cultivate 300 morgen for the 1888 season, and although little consideration will shew that an average of 300 morgen of land is but a small area to be cultivated below so large a reservoir it is only half the quantity which can be irrigated by existing furrows. The fault lies in the average catch of rain or flood water.

The total area draining towards the dam is 480 square miles, of which some eighty square miles drain into small farmers' dams which were made before Van Wyk's Vley was thought of. In a prize essay

read before the Institute of Civil Engineers, I think in 1887, Mr. Gamble did me the honour to quote from some report of mine that (in our Northern districts) it was necessary to impound the flood waters from one hundred acres in order to ensure the irrigation for the year of one acre, and, he continues, "this is a very remarkable statement." In April 1888, not having Mr. Gamble's address, I wrote to Mr. Merriman asking him to convey to Mr. Gamble my impression that my estimate would prove to have been too sanguine. Six years' experience at Van Wyk's Vley now shews that the drainage from four hundred square miles enables us to cultivate one square mile under a wheat crop. The cultivation of garden ground and supply of water to stock may perhaps reduce this extravagant proportion to, say, 300 to 1 as effective power of the dam.

My first measurements were made on farmers' dams which allowed a large proportion of the flood water to escape over the artificial "by-wash" and the quantity escaping could be only roughly estimated, while Van Wyk's Vley has never been filled and the data are therefore reliable for that one particular case.

These figures however only shew after all a peculiarity common to the enormous flats of our North-west districts and they are not applicable to any districts materially differing from ours in feature or in respect to rainfall.

With us they shew that but few dams catch so much more water during the rainy season, than will be lost by evaporation and soakage during the whole year, as will enable the owner to irrigate more than a small patch of land below each dam. In the case of Van Wyk's Vley the surplusage was easily measurable and finding this to be so very little it became necessary to increase the area draining towards the dam; this it was possible to effect on two sides of the estate as I pointed out in my published report for 1886 (G. 30—'87). I was not however satisfied as to the necessity of immediate action, the waste of water by tenants in 1886 under the crude regulations then in force was so great as to preclude any fair calculation as to the effective power of the reservoir, and I reported further to the effect that action would be premature if undertaken then.

Mr. Bain paid his first visit to the estate in October, 1887, and inspected the better of the two suggested traces for a canal in aid of the dam with the results that I was instructed to make surveys and sections for, and ultimately to construct, a canal by which to divert a portion of the flood waters from the valley to the eastward of the reservoir.

From the best information to be obtained on the spot it appeared that in years of greatest drought the main valley which it was proposed to tap would be reasonably certain to give a ten days' flow of water in a properly designed canal, and proposals were made to provide for the catch of an average of one hundred million gallons per day. The original conception has not been fully carried out, but a very fair canal, dignified officially by the name of furrow, is however now nearly completed, and it is in illustration of parts of this canal that I exhibit the accompanying photographs.

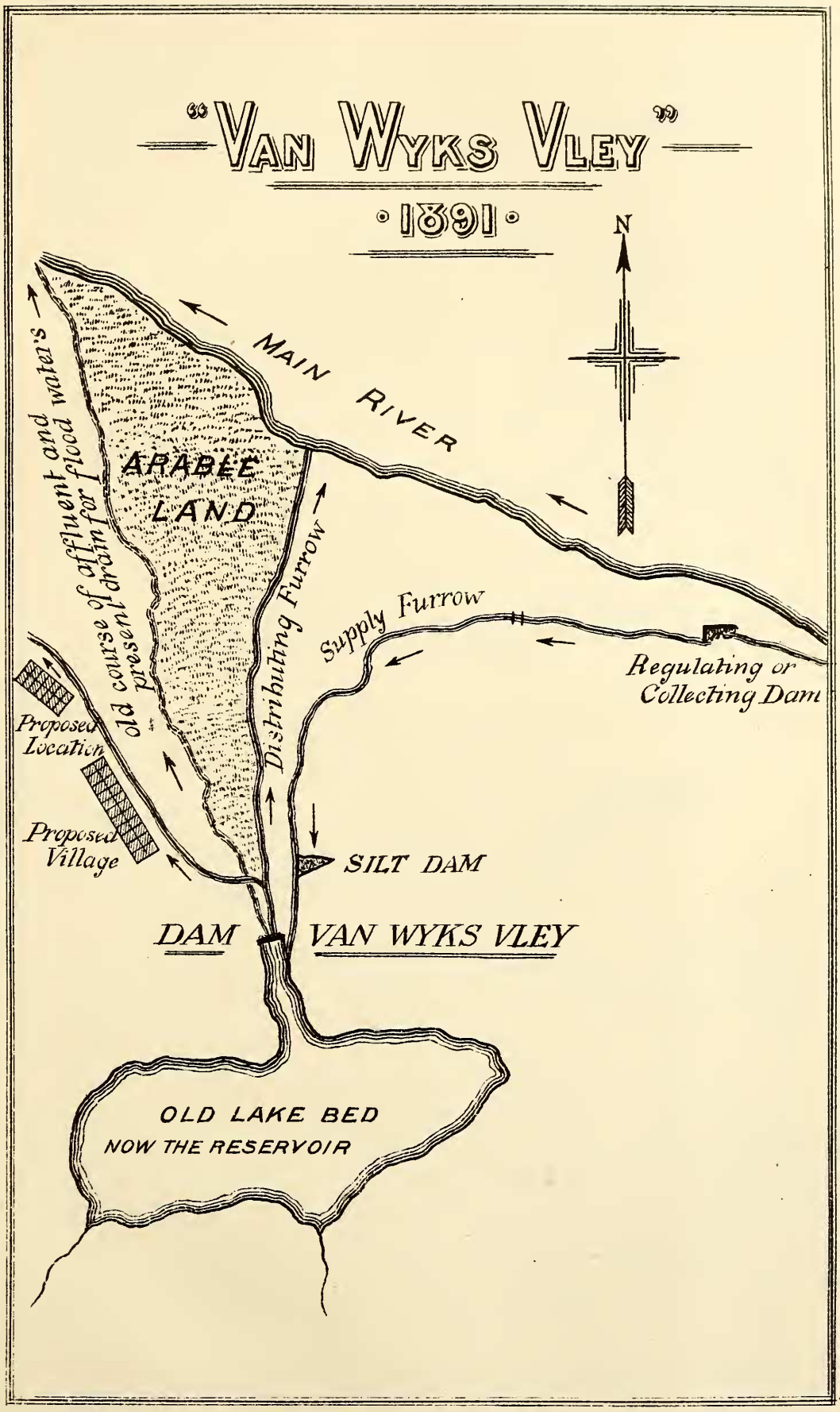
The river from which the water is taken is of a very flat cross section and is at the intake about a quarter of a mile in breadth; the natural channels draining the valley are insignificant, not exceeding two and a half feet in depth and five or six in width. The artificial channel cuts through these and is carried at a gradient of five or six feet per mile for a distance of about one and a quarter miles to the upper end of a collecting and regulating dam where the heavy silt derived from the wash through the oversteep channel above is deposited amongst the bushes naturally covering the soil. In the dam itself the water is brought to comparative rest and the lighter silt is deposited over its bed, about twenty acres, when it is discharged into the canal proper through a sluice provided for the purpose of regulating its admission.

For the next four miles the channel is carried over easy country to a point where it was found most convenient to place a relieving sluice for use in case a heavy rain should fall and overflood the canal. A *photograph* (*No. 1*) of this sluice is shown, the waterway there being twenty-five feet wide in the furrow, the sluice itself is fourteen feet in width.

From about a mile below the sluice the canal is carried on the side slopes of low ridges and *No. 2* shews one of the worst corners in this section of the work. Here I was caught by the water while widening and strengthening the work and, to prevent accidents, had to throw the earth excavated to the hill side of the channel instead of using it to strengthen the embankment.

No. 3 shews a cut through a rocky "neck" to the depth of about five feet with a view beyond of a second silt-collecting dam placed in a convenient hollow about three quarters of a mile above the discharge point into the main dam.

No. 4 shews the gully cut by the water from the canal in making the tumble of twenty feet from the one level to the other;


"VAN WYKS VLEY"
1891
N
MAIN RIVER
ARABLE LAND
Old course of effluent and water's present drain for flood
Distributing Furrow
Supply Furrow
Regulating or Collecting Dam
Proposed Location
Proposed Village
SILT DAM
DAM
VAN WYKS VLEY
OLD LAKE BED
NOW THE RESERVOIR